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ABSTRACT

The design and implementation of a doctoral program in instructional systems at Florida State University is described and analyzed. Objectives of the program are listed, along with 22 subskills to be developed. Nine possible career fields for degree recipients are identified. Eleven core competencies needed in all career fields are listed, as are 11 other "frequently essential" competencies, and the process of clustering the competencies analyzed. Management procedures are also discussed. (SK)

The Design of a Ph.D. Program in Instructional Systems[1]

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The purpose of this paper is to describe the design and implementation of a doctoral program in Instructional Systems at Florida State University. The term Instructural Systems will be used in this paper as being synonymous with instructional design and development and with educational technology. Because of the particular interest of the audience, the paper will include both a description of the process which was used to design the doctoral program as well as examples of some of the products which were developed.

A doctoral program in Instructional Systems had existed since approximately 1968 as a track within the department of Educational Research at Florida State. The program was staffed primarily by educational psychologists. In 1973, the College of Education underwent a significant reorganization, and as a result, a new department of Instructional Design and Development was established. The faculty of the department decided to use this opportunity to reexamine the doctoral program in order to make those changes which would be necessary to have a program which uniquely represented the emerging discipline of instructional systems.

In the fall of 1973, a faculty committee was formed with Dr. Robert Gagne as Chairman. Much of the credit for the quality of the effort which resulted must be attributed to his ability to provide leadership to the group. The committee consisted of 13 faculty members who represented approximately 6 1/2 full-time equivalent positions in the depart-

[1] A Presentation to the American Educational Research Association, Washington, D.C. April, 1975.

ment. Almost every faculty member had a commitment elsewhere either to teach or to conduct research and development. This time limitation was the first of four serious constraints on the committee whose purpose it was to redesign the curriculum. The second was that there was no financial support for the efforts of the committee; third, was the requirement to maintain an on-going master's and doctoral program; and, four, few of the faculty had ever worked together on an instructional design task. Each faculty member had previously worked primarily on his own instructional design project.

Getting Started

At the outset two important agreements were reached by the committee which were to effect the total redesign of the program. One agreement was explicit, namely that we would attempt in everyway possible to ignore the present program as we conceptualize what was needed in a doctoral program in Instructional Systems. The second agreement was, in retrospect, an implicit one. It was agreed that no particular instructional design model would be selected and utilized for the redesign process. I will return to this consideration later.

The first step was to acknowledge that, as a doctoral program in Instructional Systems in the College of Education, we had the following goals for our students. They should be able (1) to design systems of instruction, (2) to teach other people how to design instructional systems, (3) to conduct research in order to develop new methods of instructional design, (4) to evaluate instructional systems, and (5) to diffuse and disseminate instructional systems. Given these extremely general statements it was then possible to identify 22 subskills which were related to these five areas. Examples of these subskills were needs analysis, learning task analysis, development of instructional

materials, selecting materials and media, strategies for utilization, formative evaluation, etc. This list in essence represented a very general content analysis.

An equally important and parallel step was the analysis of the positions presently held by our own 30 doctoral graduates, as well as predicting what instructional design positions would be opening in the future. Table 1 indicates the nine areas in which students are presently employed or highly likely to be employed in the future. It should be noted that in the list of positions, the committee did not feel that it was appropriate to include the public schools as a locus of employment because, in late 1973, it did not appear that sufficient positions were available to legitimately encourage students to prepare for that environment. This situation has begun to change since the original committee analysis.

Given the list of potential positions for students, the faculty did what might be described as an experience based job analysis. For example, several faculty who are heavily involved in large scale curriculum development projects analyzed the skills which were required of the instructional designer in that environment. Another faculty member with a great deal of experience in military and industrial training analyzed the role of the instructional designer in that environment. These job analyses resulted in the identification of many of the skills which had already been identified in the general content analysis. However, the job analyses resulted in an indication of the relative importance of various skills depending upon the environment in which the instructional designer is employed.

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TABLE 1 CAREER FIELDS

1. Curriculum Development-Associate or Director of new curriculum projects, engaged in design and development.
2. Education Industry - Employment by the education industry in the development of publications, films, programmed instruction materials, tests, etc.
3. R & D Center - Employment in R & D Centers, Regional Laboratories private R & D firms, or School Systems, in instructional design and development.
4. Media Development - Employment in centers of instructional design and development, utilizing computers or other media and media combinations.
5. Training - Developers or managers of instructional development in military or industrial training.
6. University Instructional Support Centers - Employment as a research or development associate in instructional R & D organizations at universities or colleges; including professional schools and colleges such as medical, business, etc.
7. Education Office - Employment as program directors of in-house and contract R & D programs in the instructional systems area, in Office of Education, state and federal, organizations, or in private foundations.
8. Teacher Education - Positions in university centers, school systems, or Teacher Education Centers, as developers of instruction for a broad variety of teachers and other school personnel.
9. University Professor - Positions in universities teaching courses in areas of instructional systems development, conducting independent research, supervising students and conducting R & D activities.

Areas of Competency

The results of the analyses for all the career fields were compared, and two types of competencies emerged. The first type were essentially core competencies - competencies which were universally identified across the nine career fields as being areas of needed competence. In addition, 11 other competencies were identified which were judged to be frequently useful to people in particular job fields. The core and frequently essential competencies are shown in Table 2.

It should be noted that these areas of competency are stated at this point, at an extremely general level. Therefore, the next step for the committee was to have various faculty members identify the subcompetencies which would be required for attainment of each of the major competency areas. In order to perform this task, some of the faculty utilized a Gagne hierarchical task analysis approach, while others used a more job-analytic orientation. However, all the analyses were discussed and agreed upon as major subcompetencies which students would need. The subcompetencies in each major category were separately identified as those which required the attainment of knowledge and those which required the student to perform certain skills which result in products.

Throughout the process of identifying the competencies, there was a continuing discussion about the level of performance required for the various skills. It was agreed that for some career fields the instructional designer needs only a knowledge of particular competencies, while in other career fields they might need to perform these skills at an expert level. Therefore, as the committee approached the question of assessment of learning outcomes, it became clear that there needed to be at least four levels of assessments. These four levels were as follows: (1) knowing information at the conceptual level (2) knowing how to apply

TABLE 2 Program Competencies

Core Competencies	Frequently Essential Competencies
1. Goal Definition	12. Needs analysis
2. Learning task analysis	13. Job analysis
3. Definition of objectives	14. Appraising educational resources and constraints
4. Instructional materials development	15. Planning administrative adaptations
5. Instructional delivery procedures	16. Teacher materials development
6. Selecting media	17. Marketing strategy planning
7. Assessment procedures	18. Utilization strategy planning
8. Pilot testing	19. Managing teacher training
9. Formative evaluation	20. Quality control-installation
10. Revising program	21. Program management
11. Summative evaluation	22. Research design

knowledge to specific instances (3) skill in doing (4) expertise in doing. These four levels of competence significantly influenced not only the design of the assessment system but also the design of the instructional program. It was decided that knowledge level courses which had primarily paper and pencil assessment procedures, would be followed by workshop courses which resulted in projects which could be assessed. Skill in doing would be developed through assistantship and internship experiences. Dissertations would represent the demonstration of expert level performance in a specialized area.

Clustering Competencies into Courses

The committee was now ready to move ahead to cluster the various competencies into logically related areas, and for the first time to consider the relationship of these clusters to courses which existed in the curriculum at that time. These were areas related to each other in terms of content, as, for example, learning task analysis is related to the sequencing of instruction, or as student assessment is related to formative evaluation.

The outcome of this clustering was that 10 existing courses were essentially eliminated from the curriculum, four others were combined in various ways, 12 new ones were designed, and 12 remained essentially unchanged. There was almost no change in the total number of courses. There are now 26 substantive courses in the program of which 8 are at the knowledge level, 9 at the workshop level, and 9 are especially directed toward specializations in various areas such as teacher education or computer applications.

An example of the resulting integration of course work might be helpful to demonstrate the various levels of competencies to be developed by a student. Since the most critical skills in the program are related to the design, development, and evaluation of instructional materials, two courses were specifically designed at the knowledge level which provide an introduction to instructional systems and an introduction to instructional media. After taking these courses a student enrolls in a series of workshop courses. He first designs a unit of instruction and then produces it in one of the following formats; programmed instruction, computerized instruction, multi-media instruction, or radio/television instruction. This is followed by an evaluation course in which the products developed in the production courses undergo both formative and summative evaluation. Students taking these courses are also working on assistantships in areas such as the Individualized Science Instructional System curriculum project or the Center for Educational Technology, as well as developing dissertations which utilize instructional development skills.

After the competencies had been clustered, each faculty member was asked to write a course description which included the competencies to be achieved in the course, the general mode of instruction, and the assessment procedures which were to be employed. These descriptions were then used by the faculty to design or redesign courses. Three new courses were offered in the Winter Quarter, and six more are being offered this Spring. They are undergoing formative evaluation in terms of both their quality and the scheduling sequence.

Management Procedures

In addition to the instructional design process, it was also necessary to reexamine the management procedures which would be employed in the program. Of particular importance to this presentation are the decisions which were made with regard to the assessment of students. There are basically four major assessments which are of importance. The first is the admission of students to the program. Since we have yet to identify any particularly effective predictors of success in instructional design and development, the criteria for admission remain primarily those prescribed by the State University System, namely academic performance, references and previous experience.

Once admitted, the student is then qualified for the doctoral program in his second quarter through a process in which the entire faculty reviews the student's performance to-date and informally assesses the prognosis for his success in the total program. This is an early screening to identify any potential problem situations.

The major assessment change came in the area of the preliminary or comprehensive examination. The usual process of memory dumping for days on end has been replaced by a procedure by which the student provides the doctoral committee with both a product which he has developed and a list of the areas of expertise upon which he wishes to be examined. This product can be an instructional package, a research paper or a theoretical paper. The committee develops a series of questions using the product and the areas of emphasis as points of departure. The student has five days to answer these questions and may use any available resources. The written examination is followed by the traditional oral examination.

The fourth, and final, assessment is the dissertation. The faculty have agreed that the dissertation must, in general, be a research based study in the area of instructional systems design, development, and/or evaluation.

Summary

It was indicated at the beginning of this paper that no explicit instructional design model was agreed upon by the committee prior to undertaking the task of redesigning the doctoral program. However, in retrospect, it is apparent that a relatively straightforward instructional design model was followed. Goals were set in terms of the examination of the Instructional Systems discipline and job analyses. Through task analysis procedures, the major subcompetencies which would be required in various career fields were identified. Assessment levels were established and these were utilized to design the instructional context and the various procedures which would be utilized for evaluating students.

It is clear that every instructional design and development project must operate within a given set of constraints. Constraints upon the faculty members who undertook this project were indicated earlier. There is no way yet to validate the outcome of the process that was employed. However, the reactions from students thus far has been quite positive, and you may be assured that even if we become lax in our evaluation of the program, the students will not permit us to do so for long.